INTRODUCTION

The central argument for Optimality Theory (OT) was an argument of explanatory adequacy. Kisseberth 1970 was the first to observe that rule-based phonology had no mechanism for explaning relationships between outputs of phonological rules. SPE-style bracketing conventions, he argued, did not always pick out the sets of rules that had a natural relationship with each other, a relationship that was based on the similarity of outputs these rules produced. Kisseberth showed that languages tend to contain clusters of apparently different rules, all of which conspire to create a particular pattern of syllable structure, seemingly catering to a preference to produce a certain kind of output. Over the years, Kisseberth's original insight was developed, culminating in the realization that the weight and importance of output-based conspiracies was too great for standard rule-based theory to handle.

These arguments became the cornerstone of OT, the most radical version of the set of theories that recognized the importance of output generalizations.

It has become apparent in recent years, however, that OT faces a number of systematic challenges that appear to be related to its radical commitment to locating ALL phonological generalizations in the output. These challenges fall into two broad categories. The first set, which I briefly mention here but will not deal with in the remainder of the thesis, have to do with SERIALITY and OPACITY. Cases where the conditioning environment of a phonological process is not met in the surface representation, or where a conditioning environment is present but the process has not applied, have required extrinsic rule ordering in derivational theory. Because this mechanism is not available to OT, the theory faces a systematic challenge in handling opaque interactions. Much work has been done in this area, using two general strategies: first, introducing a serial or stratal architecture into OT, and second, modifying the set of constraints and their interpretation to allow opacity to be handled solely by output-oriented constraints.

The second systematic challenge faced by OT, which will be the subject of this thesis, also has to do with generalizations not being surface-based. It has become clear in recent years that Kisseberth's original argument in favor of surface conspiracies can be turned around as an argument against the radical surface orientation of OT. Perhaps most clearly this can be seen in Steriade's (2001) work on the typology of repairs for the constraint against final voiced stops. Given a markedness constraint penalizing final obstruents from being voiced, *[+voi, –son]#, the only attested repair for violations of such a constraint is final voicing. Other potential changes that also could obviate violations of this constraint are not attested as responses to final voicing. Among them are nasalization, deletion, metathesis, and epenthesis, as illustrated below.

(1) /tab/ → [tab]   (faithful output)
          → [tap]   (devoicing)
          ↛ [tam]   (nasalization)
          ↛ [ta]   (deletion)
          ↛ [tba]   (metathesis)   } *unattested*
          ↛ [tabə] (epenthesis)

Steriade stresses that while final epenthesis, deletion, etc. are common across languages, these processes are unattested AS REPAIRS for final obstruent voicing, i.e. they never selectively target voiced stops. However, standard OT has no direct way of ruling out such repairs, as long as the surface condition expressed by the markedness constraint *[+voi, –son]# is satisfied in their outputs. It appears that surface-oriented constraints conspire to produce some input-output mappings but not others. This general challenge for OT has come to be known as the TOO-MANY-SOLUTIONS problem. Steriade compares this difficulty to Kisseberth's classic conspiracy argument.

> "Kisseberth's (1970) insight that conspiracies arise when the sound system aims at a specific target structure via multiple means can lead one to ask the same question, in the context of rule-based phonology: if the rule of final devoicing aims to eliminate final voiced obstruents, why aren't there rules of final obstruent nasalization, deletion, metathesis or post-voiced obstruent epenthesis?" (Steriade 2001: 6).

Such constraint conspiracies will be the focus of my dissertation. I will argue that the origin of the difficulty faced by OT in this and other similar cases has to do with the locus of the phonologically significant generalizations. At least some generalizations in phonology are most insightfully formulated not as output statements, but as statements about input-output mappings, and about environments of processes. The thrust of the argument is thus analogous to the original conspiracy argument in favor of OT, albeit in the opposite direction.

The thesis is organized as follows. In Chapter 1 I take a look at a too-many-solutions problem that has not received systematic attention in the literature, the interaction of prosodic structure with segmental features. The typology of the interactions is asymmetrical. Broadly speaking, metrical structure can condition the distribution of a greater range of phonological properties than it can be sensitive to. Stress can interact bidirectionally with only three properties: quantity, tone, and vowel sonority, while the set of segmental features that can be sensitive to prosodic structure is broader and includes such consonantal properties as aspiration, continuancy, and voicing. While the distribution of these features is commonly sensitive to stress, they are not observed to condition the placement of stress in any language. This asymmetry in interaction between prosody and segment is schematically illustrated below.

(2)
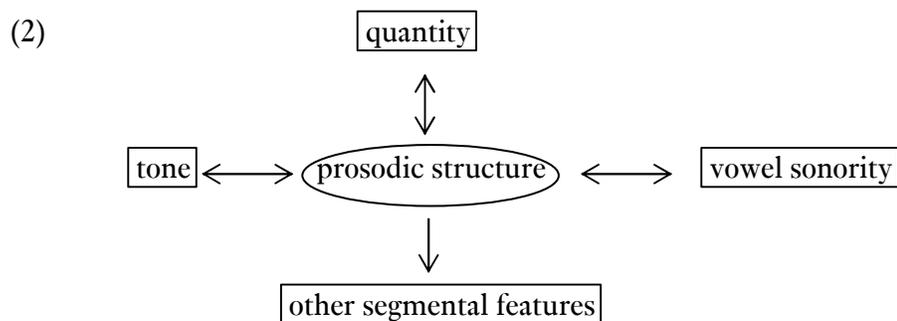
I will argue that such a pattern of interaction between two phonological properties presents a challenge for standard OT, because the generalization is best stated not in terms of output structures, but as a constraint on input-output mappings. OT markedness constraints are output conditions. However, a constraint that calls for two

properties such as stress and aspiration to cooccur on the same syllable in the output cannot account for aspiration attraction to stressed syllables (stress-driven aspiration) without also predicting interaction in the reverse direction, i.e. aspiration-driven stress. This too-many-solutions problems turns out to be a general one in the case of stress-segmental interactions. As I will argue in Chapter 2, the problem cannot be handled by three existing general proposals on too-many-solutions problems: Targeted Constraint theory, the P-map, and fixed rankings between classes of constraints.

In Chapter 3 I move on to my proposal. The diagnosis of the difficulty faced by standard OT in too-many-solutions problems has its origin in the locus of the phonologically significant generalization. While standard OT has claimed that all generalizations lie in the output structures, and while OT markedness constraints are statements about outputs, I argue that in the case of prosody-segmental interactions it is in terms of the input-output mapping that the generalization is most insightfully stated.

This diagnosis leads to the solution. I introduce a new class of markedness constraints that directly penalize the unwanted input-output mappings by stating the asymmetrical direction of interaction between two phonological properties. These PROCEDURAL constraints are given in the form of implicational 'If-then' statements, such that the asymmetry of interaction between the two properties mentioned in the constraint corresponds to its asymmetrical statement. For example, the procedural stress-aspiration constraint will be stated in the form 'If a syllable is stressed, then its onset is aspirated. The formal machinery introduced in Chapter 3 ensures that the property mentioned in the antecedent part of the constraint can force the unfaithful mapping of the property mentioned in the consequent, but not vice versa. Thus, the procedural stress-aspiration constraint will be able to force stress-driven aspiration, but not aspiration-driven stress.

This proposal provides a general way of handling asymmetrical interactions in phonology, and a general way of dealing with too-many-solutions problems. In Chapter 4 I will apply the proposals from Chapter 3 to a new set of cases, vowel epenthesis and deletion. I will argue that the typology of both of these processes is not as rich as

Standard OT would predict, and show how my proposal can be used to constrain the interaction of the phonological properties. I will argue that vowel epenthesis is used exclusively as a response to pressures of syllable structure, sonority sequencing, syllable contact, and word minimality, but cannot be used to avoid violations of other metrical constraints. The typology of vowel syncope is constrained in terms of its environment: syncope targets only weak vowels, i.e. those vowels that are unstressed, posttonic, in the weak branch of feet, and so forth. Crucially, I will argue that metrical constraints cannot force the deletion of STRESSED vowels, a claim that goes against current thinking in OT.

In general, both syncope and epenthesis show generalizations that are best stated not in terms of output preferences, but in terms of the environments of the processes. This, once again, diagnoses the difficulty that standard OT has with the typology of the processes, and makes them amenable to the procedural constraints proposed in this dissertation.